

CLAIMS

The following is a copy of Applicant's claims that identifies language being added with underlining ("____") and language being deleted with strikethrough (" "), as is applicable:

1-7. (Canceled)

8. (Currently Amended) A method for nano-indentation, comprising:

providing a substrate having a polymer layer disposed on the substrate, the polymer layer includes a polymer material that is in an uncured plastic state;

providing a stamp mask having a photomask and at least one nano-indentation structure for forming a physical feature on the polymer layer, wherein the photomask does not cover at least one area of the polymer material; and

stamping the polymer material with the stamp mask, ~~wherein the polymer material forms the~~ to form a physical feature on the polymer layer caused by the at least one nano-indentation structure;

removing the stamp mask; and

curing the polymer material after the stamp mask is removed.

9. (Currently Amended) The method of claim 8, further comprising:

exposing the at least one portion area of the polymer material not covered by the stamp mask to an optical energy to form at least one exposed area of polymer material.

10. (Currently Amended) The method of claim 9, further comprising:

curing the polymer material, ~~wherein the at least one exposed portion of polymer material is removed, wherein the polymer material not exposed to the optical energy is cured, and;~~
removing the at least one exposed area of the polymer material.

11. (Currently Amended) The method of claim 8, further comprising:

curing the polymer material, ~~wherein the at least one exposed portion area of polymer material; is cured, wherein and removing~~ the polymer material not exposed to the optical energy ~~is removed.~~

12. (Original) The method of claim 8, further comprising:

forming a polymer structure having the physical feature.

13. (Original) The method of claim 8, wherein the physical feature is selected from a multi-tooth physical feature, a "seat" shaped physical feature, a single point (triangle tip) physical feature, a double point (inverted triangle tip) physical feature, a crescent shaped physical feature, and a half-circle physical feature, and combinations thereof.

14. (Currently Amended) A method of forming a structure, comprising:

providing a substrate having at least one element and a polymer layer, the polymer layer is disposed on the substrate and the at least one element, wherein the polymer layer includes a polymer material selected from a positive-tone polymer material and a negative-tone polymer material, wherein the polymer material is in an uncured plastic state, and wherein the element is selected from a refractive element and a diffractive element;

providing a stamp mask having a photomask and at least one nano-indentation structure for forming a physical feature on the polymer layer, wherein the photomask does not cover at least one directly exposed portion of the polymer material;

stamping the polymer material with the stamp mask to form a, wherein the polymer material forms the physical feature on the polymer layer caused by the at least one nano-indentation structure; and

exposing the at least one directly exposed portion of the polymer material to optical energy, wherein the optical energy passes through the at least one directly exposed portion of the polymer material and interacts with the element, and the element redirects the optical energy through the polymer material forming at least one area of indirectly exposed polymer material;

removing the stamp mask; and

curing the polymer material after the stamp mask is removed.

15. (Original) The method of claim 14, wherein the polymer material includes the positive-tone polymer material and further comprising:
removing the at least one area of indirectly exposed polymer material and the at least one directly exposed portion of the polymer material.
16. (Original) The method of claim 14, wherein the polymer material includes the positive-tone polymer material and further comprising:
forming tunnels within the polymer material where the at least one area of indirectly exposed polymer material is removed.
17. (Original) The method of claim 14, wherein the polymer material includes the positive-tone polymer material and further comprising:
forming slanted polymer layer walls by removing the at least one area of indirectly exposed polymer material.
18. (Original) The method of claim 14, wherein the polymer material includes the negative-tone polymer material and further comprising:
removing the polymer material except for the at least one area of indirectly exposed polymer material and the at least one directly exposed portion of the polymer material.

19. (Original) The method of claim 14, wherein the polymer material includes the negative-tone polymer material and further comprising:

forming a polymer structure having at least one slanted polymer wall by removing the polymer material except for the at least one area of indirectly exposed polymer material and the at least one directly exposed portion of the polymer material, wherein the polymer structure has the physical feature.
20. (Original) The method of claim 14, wherein the structure includes a waveguide having surface relief features.
21. (Original) The method of claim 14, wherein physical feature is selected from a multi-tooth physical feature, a “seat” shaped physical feature, a single point (triangle tip) physical feature, a double point (inverted triangle tip) physical feature, a crescent shaped physical feature, and a half-circle physical feature, and combinations thereof.